The Impact of Machine Learning in Energy Resource Allocation, Workflow Scheduling & Live Migration in Cloud Computing - Meta Analysis

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Abstract- Machine learning and artificial intelligence are effective in addressing complicated problems including energy optimization, workflow scheduling, video gaming, and cloud computing. When machine learning and cloud computing methods are coupled, they help obtain better results by improving the performance of cloud data centers compared to current solutions used by various academics. It is also useful for relocating virtual machines based on current traffic conditions, including fluctuations caused by network congestion and bandwidth availability. The survey intends to provide improvements in dynamic load allocation, work scheduling, energy optimization, live migration, mobile cloud computing, and cloud security through machine learning categorization. Machine learning algorithms automate pattern recognition and simplify the learning process. The paper includes an introduction, motivation, background study, cloud-machine learning integration framework, best practices for introducing machine learning in cloud computing, and the work's purpose. The paper discusses machine learning-based cloud services and the use of artificial intelligence in various cloud computing platforms.

Keywords— Cloud computing, Resource allocation, Data center, chatbot, Internet of Things.

INTRODUCTION

In recent days AI can directly help in the computational and pattern recognition field where ML is becoming important through various approaches & technologies. It is observed that the research that is done on ML becomes easier and better in cloud platforms. In ML there are various disciplines that can be at the forefront of automation. Machine embodying intelligence used to minimize cost and error for increasing efficiency. Cloud distribution encouraging ML has broad value for that although the value will not be cherished if machine learning is streaky on a system that could not profit from making predictions based on patterns found in data. The equation between cloud and machine learning. The actual value for these two business propose if applied suitability. Many organizations using these technology where both the technology ML and cloud worked together. The availability providing by machine learning to improve performance & security for new applications & services using real time approach, basically the application area like e-health, traffic and industry require communications network for fetching real time decisions automatically. In many cases Ml has been founding as the game changes in business point of view. To build a better results & value. The applications related to ML acquire importance from the technology & predictive marketing, fraud detection inventory management & more various solution patterns are being provided which cannot be the same as the ML model. Google Amazon AWS cloud providers give the support for predictions that are being appointed. The Software and Hardware prices are more costly and most reliable in many firms. Another point is the expenses are not paid, that does not mean they are not accomplished enough to take care of the design of the prediction model. In cloud computing platforms different ML approaches are utilized to plan VM to provide dynamic scalability reallocation of resource, energy and dynamic load balancing. The ML technique is basically implemented to optimize better result, accuracy, less response & execution time. The technology similar like ML trained the machine to perform their work independency & minimum human participation is required. AI that contains a huge number is a subcategory of ML containing a huge number of datasets for testing purposes after utilizing these development learning methods in ML. The concept is to study the variables that would help to achieve the data in compact form by supporting various functionalities.

For such cases there are dynamic & emerging roles for II.In any environment such technology can work. The output of the system may vary according to their input and from past experience also. So, Machine Learning can be gained important in every platform. Currently ML is emerging with 6G technology in the business market. In this work we mainly focus on to get the capability of machines in a cloud environment. The Novelty of this work for suggesting the disassembly energy key lies in studying ML based on energy efficient resource allocation mechanism. In this work we also cover the various machine learning based scheduling techniques. Learning based Virtual Machine migration policy using the ML classification and prediction better mobile Cloud Computing framework offering the best security. On the ML cloud solution we work on the systematic and comprehensive survey with the key areas like energy Optimization resource allocation and live migration with dynamic load balancing in mobile Cloud secure path in infrastructure.

BACKGROUND STUDY

In the cloud computing environment this work delivered on the framework of cloud machine learning integration that describe the dynamic task scheduling resource allocations & migrations objective of these work & various approaches on Machine Learning. The work must describe different AI & ML approaches in the cloud platform & Machine Learning based cloud services.

Cloud Machine Learning Framework

Here we elaborate the framework for cloud machine learning integration for dynamic scheduling resource allocation and task migration. The purpose is to use the different ML Technique for improving cloud computing performance with respect to active resource management prediction of required VM allocations. The ML technique are more efficient in using resources, workload consolidation & energy savings, dynamic scheduling, resource migration and load allocations using various ML approach. There is a task management workload is allocated in cloud platform such as T1 to T8 and the resource allocation block shows how many job are allocated to the other resources such as R1, R2 & R3.Further load will balance using task migration from one to another resources, migration time is used to computed to transfer the task including pre and post migration evaluation parameters. The job of ML model is to organize & train in cloud resources to perform the dynamic scheduling for load allocation & migration.

Motivation for the work

To explore & find the Machine Learning approach applied to workflow scheduling, dynamic resource allocation, live migration on the cloud and task for energy Efficient on cloud computing environment. different research activity on cloud and its benefits is the primary concern of machine learning the benefit also take care from different research activities the work motivation is as follows:

a. Analysis and study various ML approaches for a Cloud Computing task.
b. For energy optimization apply optimal ml method and also for task scheduling, live migration Cloud Computing security, and dynamic resource allocation.
c. Based on performance parameter comparative based analysis performed using machine learning method. various research has been done in the CC environment.

Investigation of the work

The work and study carry the following investigation.
a. Various AI technique how they are embedded in cloud computing for different services
b. Most efficiently investigation machine learning for workflow scheduling, energy resource allocation, live migration and other in cloud computing and year by year evolution predictions studies.
c. machine learning influence in the cloud computing environment.
d. supervised and unsupervised machine learning methods.

Benefits of machine learning in cloud computing environment:

In the business intelligence, fraud detection & customer support AI gradually building ways to enterprise applications. Machine learning which a subset of AI is. There are many possibilities to get the best result that can be achieved after combining cloud with machine learning.
a. To use a much larger workload in machine learning the cloud follows a pay-per-use prototype.
b. The business users various try out with ML that evaluate & scale up their project for best growth & invention in demand with the help of the cloud.
c. Google cloud, Microsoft azure platform & aws given various Ml options that don't need much information about AI.
d. In data service and AI there is no need for enhanced techniques for making intelligence capabilities accessible by cloud.

Role of AI and ML in cloud platform:

ML takes a very important role to control data over cloud environments. After continuous research in AI & CC platforms it has become more intelligent than earlier. For better use of the ML & CC platform it becomes more intelligent than earlier. For better use ML or CC become so critical every cloud current days. Reputed companies like google, Microsoft & amazon have invested a lot of research in AI & ML. A fusion is implemented between two technologies like AI & ML in cloud platforms to get the best and new

services in the field of technology research activities. One of the most significant evaluation in technology is bringing machine learning to enterprise applications for infrastructure, development & extraordinary hardware supplies that lifted the budget for manual labour. Those difficulties can be solved using CC without any burden. Various platform supporting clouds can be resolved & make it easier for enterprises to influence Ml skills to crack business evil.

Cloud service ML Based:

In the field of intelligent cloud the CC business is gaining importance. Many researcher has been done in this domain to make it more liveable.The vendor of clouds are much concern about this storage. The purpose of these storage are the main pillar for cloud business, Perallay ML can be gain space in the cloud background the environment make AI for working best. The fusion between Ml & CC are valuable for both technology. How ML is becoming an essential aspect of the intelligent cloud.

a. **Chabot as a service:**
Current days while mobile app adoption conventional is getting stagnate interactive bots are gaining support with the practice with user bots are quickly replacing apps. In the SNS apps we chat are gaining popularity the plea for implanting bots is also increased. Machine is making these bots best current days. The query of customer can handle using bots. It help to providing meaningful discussion with users. Microsoft azure bots & IBM watson botkit for such type of platform.

b. **Business intelligence as a service:**
Managing Ml in cloud computing business intellect service are also getting much more intelligent both the technology are helping for work better. It help to shoe the different data in a single place and work collectively on the provided data, the blending of CC with ML algorithm serves its best to improve existing condition & incorporate intellect system.

c. **Machine Learning Based IOT:**
In Cloud platform IOT is trending back in with its new version. Sensors will help to capture different data to query the process and examine the significant trends with the help of ML in IOT. It is more intelligent and best for use. Various ML algorithms worked to get the perfect system that can be best associated with accepting the outline of datasets produced by devices. Such system proficiency has taken the business of IOT to the next level. Microsoft Azure IOT & IBM Watson IOT are examples of these.

d. **Speech based personal assistant:**
Ml enhances the voice base PA more capable than previous one. Using pass choice and trends the assistant can get customized experience like voice based personal assistant. Can get customized experience make a playlist according to the mood dynamically according to the prescribed period. API's are exposed by the assistant by giving the power of ML to the hand of developers. They modify the experiences supplied to users. Google assistant microsoft Cortana, amazon alexia are some examples of this platform.

e. **Cognitive Computing in cloud:**
The large amount of data are stored in cloud. The ML algorithm the data is working as a primary source for data sharing, networking & storage millions of users are used cloud platforms. Using those information ML have become much better such applications are used for execute the cognitive process & predict the outcome. The organization like IBM watson, AWS and Microsoft will be focus to implement cognitive AI in more critical field like health care, marketing and finance & many other sector along with previous sector.

Work on cloud computing using ML classification the details work in this paper discussed below.

Energy efficient resource allocation on cloud using ML

The main challenge is to maintain the system performance & maintaining a balance between power utilization & performance. With the energy utilization and without hampering the performance & Quality of service delivered on the cloud using ml. By the running application the main focus of the tutor Center the high performance. Power consumption and performance cannot be considered the main focus on the stability among both system and power consumption. The benefit is to provide large amounts of data without any cost. The drawback is to primary use running task can be sacrificed. How decrease energy wastage by giving job to computer less used for primary use & ML predicting the time. Machine learning approach multilayer perception & random forest integrated both. The task done take 51.5% of energy can save affecting the task completion. In cloud data center the VM method using in Pl to maximize performance & energy efficiency using VM results are better in energy saving & performance using VM methods In the experimental phase. The results are better in energy saving & performance using the VM methods. The help of various research done energy efficient using ML. a lots of problem solved with efficient results Task scheduling problem where data center and user job changes dynamically multi-objective CSA based optimization algorithm. The resource of cloud computing to be working optimally in changing environment. A CSA based algorithm that uses the system resources is appropriate for CC to reduce power consumption. Machine learning combined with distributed technology has provide & efficient way to solve energy efficient cloud platform. HUA is used in its VM's on another host. In the process of workload consideration under loaded is one of the significant stages.

$$Ewes (N) \Delta \Sigma M \ am \ we \ Unum \ Rum \ (n)/ \ go \ (n)$$

Where EWS = energy efficiency metrics. M = {0, 1, 2,., M}

Denote the set of all BSs. m ∈ M = set of Um users denoted by Um {1, 2,., Um}.

Further research shows non-machine learning methods for energy sustenance in data centers and how machine learning used other objectives in cloud computing.

ML based Workflow scheduling Cloud Environment:

The expansion of Information Technology uncertain progress of both data volume and complication of the data processing itself. A scheme where ANN & principal of Rl have been used. The platform used to allocate the work captivating according to the needs. The given computational model there by reducing the execution time according to computation resource availability thereby decreasing the waiting time & reducing execution time task scheduling model is introduce upon I-Apriori algorithm using Fog computing. The model that obtain better result in case of task execution time & waiting time. It can be said for computation architecture is the next generation of CC. The main problem faced in fog computing is allocating resource to decrease operational cost & completion duration. A new perspective is introduce to decrease the cost & time duration of operational task. A multiobjective task scheduling algorithm mapping to reduce the cost & production capacity of data center without split the service level agreement. The algorithm give optimal scheduling procedure .The execution time is the major concern but in case of cloud computing platform various parameter are required to be taken such as cost & bandwidth of user with time, the resource scheduling in the cloud platform can be solved by used AI Algorithm & deep reinforcement learning.

The Main problem is to choose the correct resource scheduling algorithm for a particular workload. Where the nature of workload is basically dynamic, a schedule technique used for the deadline sensitive task. It is tough to distribute resource on demand within the prescribed time. The comparison done between current techniques that is better. The structure of task scheduling use machine learning methods where VM & data center configuration has been done. The formation of processing element & hosts & setting up data center features.VM configuration like VM size, Image size, processing power & generating several processing element. Scheduling is a procedure that is used to regulate the command of task that is achieved by the system. The scheduler having best scheduling policy according to the task in different cloud environment.

With the help of ML classification assortment effective scheduling algorithm approach is accomplished. In the beginning VM & task attributes are extricated & accepted as training datum algorithm used training data as input which further generate as per classification rule are selected & accomplished task execution. The proposal which is applied checked in the cloudsim toolkit.in the cloud environment fog computing taken as the next generation it used according to needs generate by the device. Allocating of computing resources is the main concern to decrease the operating expenses & execution time. The consideration of datacenter in the cloud infrastructure as 'U'.we define to better outcome.

We define the Transfer Time TT (I, j) between two tasks corresponding to a weight of an edge (i, j) ∈ E in the application graph (DAG), which corresponds to the time taken to transfer data from task ti (executed on vmp lodged in data center Ua) to task tj (executed on vmk lodged in data center Ub), as in the following equation. TT(i, j) = datai, j / Transfer rate (p, k)

where data i,j is the size of the output data produced by task ti and transferred to tj.T represents workflow scheduling on cloud platforms using machine learning classifications for achieving better outcomes.

Cloud-based load balancing using machine learning techniques:

Cloud platform load balancing helps to provide each node with an equal amount of data load balancing and can distribute equal amounts of data from one node to another to get better resource utilization. It basically work for the complete betterment of the system. Load balancing is important factor if it is properly done that is beneficial in optimal utilization according to the researcher the total load for all virtual machine can be defined as –

The total loads (L) for all virtual machines can be defined as.
$L = \Sigma_{i=1} k\ li$
i = number of VMs in a data center. Load per unit capacity, which is also called LPC can be defined as: $LPC = L / \Sigma_i = 1\ ci$
(4) Ci = capacity of the node.

To get the high performance & more better results through ML linear regression process is applied to get the effective load balancing results in cloud platform. The challenges faced during maintenance data when shifted from an overloaded machine to underloaded machine along with suggested techniques & different techniques make a comparison between equally spread current & execution load along with round robin techniques are used to perform various window operating system.In terms of responses time. Load balancing algorithm are more fundamental to getting better results in global throughput & grid resources.

Live migration on cloud computing using ML

Live migration ensuring the quality in services to be delivered to users is one of the best suited approch.Live migration help to sharing a host with multiple VM's.one or more applications runs simultaneously. If the host is over or under utilized both time migrations are one of the advantages. There are various benefits of live migrations. Reducing the energy maintaining Slab level. The drawback can be benefits & sometimes harm VM application especially during migration the movement between VM & Host machine should be fast it is required to use the live migration approach.

The expression relating the duration of the migration Ti to the relative number of elementary operations for the migration

time X and the number of migrations N for the observation period T can be written

$X = m \, \Sigma \, T_i \, / \, t_{min}$

where tmin is the minimum duration of an elementary operation;

ko = tmin / m. To

where T0 is the length of the monitoring window;. m is the number monitoring window.

The linear and non-linear predicting methods with arrangements of various prediction algorithms called an RNN for predicting network bandwidth and CPU utilization in live migration approach.

Machine Learning Technique for Mobile cloud computing:

Mobile computing has reached a popularity among various users and large institutions. Every day at least N number of users get connected with the cloud. Thanks to the cloud service and wireless connectivity Cloud bonding has become one of the earliest and reliable tasks. The algorithm that proposed a machine learning Technology that reflects user input network device. Energy and device resources. The time and energy can achieve better result. The offloading choice working in mobile Cloud environment to reduce this algorithm. Virtual reality described that the existing algorithm supports various applications where energy time and crushing out the resource use in it.

Central part of the structure is a decision component for code offloading. There are two components one is mobile application and another is code offloading. It Can adjust task distribution in mobile computing & resourcefully delivered facility that require multifaceted computation like multimedia processing.FIFO queue is implemented multi- media server application. To check accuracy the development prototype which can be useful for transfer in various operating system such as iOS, Windows and Linux. It will help to decrease the volume of work by using hybrid application. Different opportunities can utilize ML for mobile devices to provide service within the framework of mobile cloud computing. The projected explanation influences various things like knowledge of mobile device & network connection potential. It will help a lot for improving the better result with good accuracy.

Machine Learning Technique for Mobile cloud computing:

Cloud computing platform users face the main challenges in Cloud Security. Various threads like server spoofing address resolution protocol & Dos.There has an encouragement classification and detection model that help in securing cloud computing environments. It involves its effort analyzing the security issue also in storage and authentication level. There are two types of data sensitive and non-sensitive data. It achieved the best security over the data set and found the best method. There are various attacks occurring in cloud computing environments like man in the middle attack, injection attack, and authentication attack in cloud. There different ML algorithm used for security purpose & logistic

regression .A cloud security model that help to improving in data efficiency. It has two main algorithm neural network & ML using encrypted data the technique is much more realistic & practical for training the neural network for the encrypted data.

4. RESEARCH GAP DISCURSSION

For energy resource allocation, workflow scheduling and live migration in cloud computing given a comprehensive summary of research in the domain of ML. We address ML classification for different cloud research activities, the article provides a compilation of valuable results.

Role Of different supervised & Unsupervised ML Model:
Ml uses supervised learning for the majority. There are input & output variable X and Y in supervised Learning $Y=f(X)$
The major concern on supervised learning is to estimate the mapping function so the new input data calculate the output variable.so the training dataset can be act as a who supervised the learning process through training data algorithm make rough calculations & further supervised learning problem into regression & classification problem. Some important famous example of supervised ML are-

a) The support vector machine is the primary example for classification problems.

b) Random forest is the main example for both regression and classification problems.

c) Linear regression for the regression problem
.

There are no corresponding output variables; only input data is denoted as unsupervised learning. To developed a structure in such a way so that we understand more about the data. There are no guidance or accurate and like supervised learning so it is known as unsupervised learning. Associating with clustering problem there are two group of unsupervised learning.

– K means for clustering problem and
– A priority algorithm for association rule learning problems.

In different services how cloud are embedded in artificial intelligence technique:

In different field AI helps to uplifting the IT infrastructure & throughput. Many volume of data AI and CC make a fusion there are lots of tools lie google cloud vertex, IBM Watson, MS azure & AI service portfolio are easy to use. There are lots of benefits of AI in cloud computing are lower cost, Automation deeper insight. Data management improvement & increased security. A lot of existence & acceptance In ML offer a lot of numerous acceptance that made tremendous contributions to the body of knowledge. The benefits have been followed by fusion of ML and the cloud has put forward many benefits. Different cloud providers use the fusion to get better results.

Metric & Evaluation Model using by MLbased cloud service:

Prediction models critical for determining their performance, the metrics can assist in comprehensive prediction accuracy & in computing different models. This metric used to evaluate the predictions.

CONCLUSION & FUTUTURE SCOPE

In the field of Cloud computing, the intelligent cloud is the next progress that appeals by lots of researchers, providing acceptable computation results, one of the major dares in cloud computing in ML. the survey investigate the different cloud research activities in energy consumption, workflow scheduling, live migration & load balancing on the cloud using ML method privacy policy. In these paper we highlighted the critical learning method. In this study we look into machine learning based cloud services & the importance of AIML in cloud computing .The Ml approaches applied in different cloud computing research areas Ml is likely to help increase data center utilization and resource scheduling. Deep understanding can help learn better optimize the solution to get better results for cloud computing task. The development further can be made by combining meta-heuristics approach with ML for cloud resource allocation. Better scheduling decision & energy optimization.

Declaration of Competing Interest

The authors declare that there is no conflict of interest reported in this paper.

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